Sept. 19, 1944. M. E. McGOWAN 2,358,651

METHOD AND APPARATUS FOR SPRAYING LAMPS

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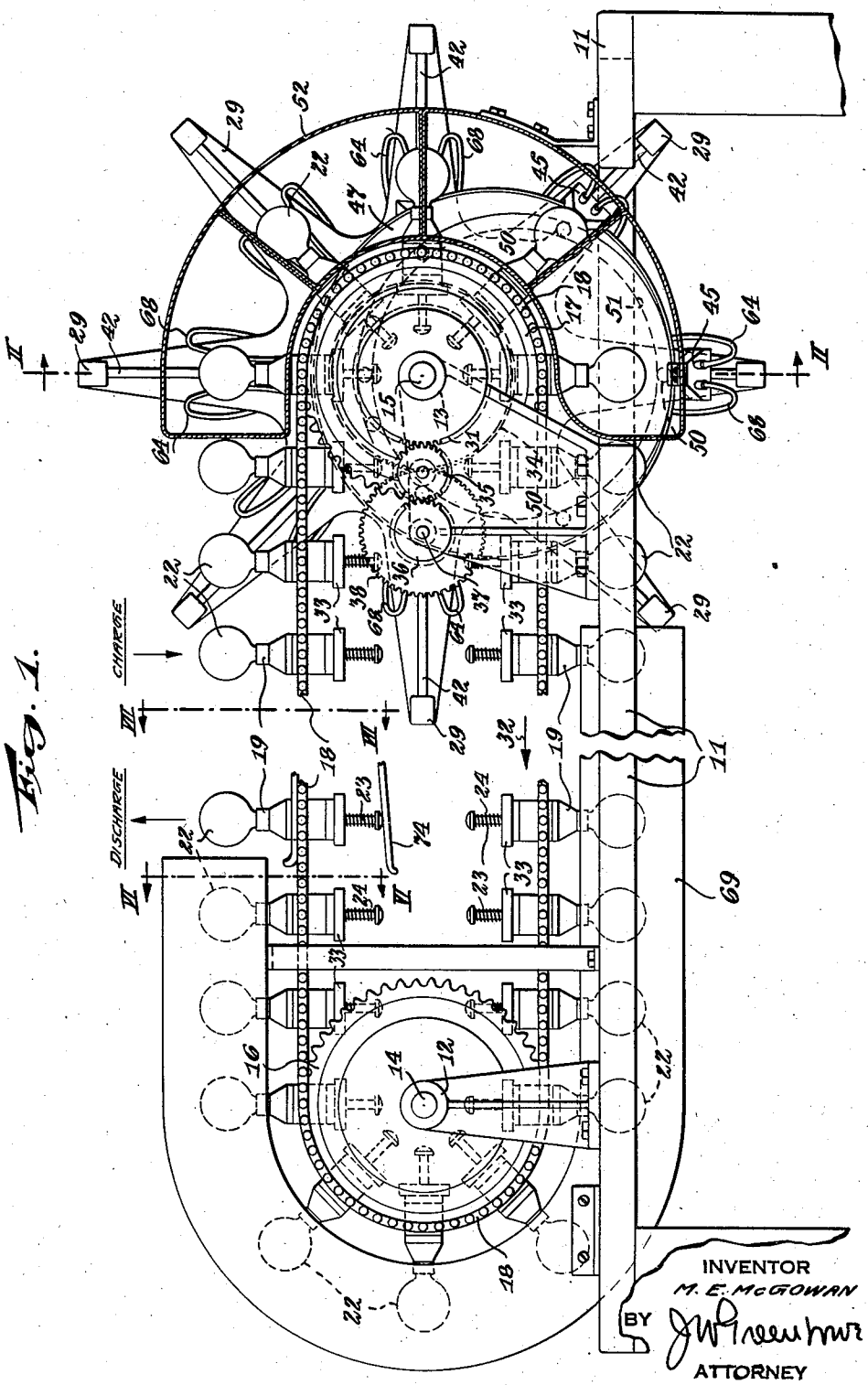


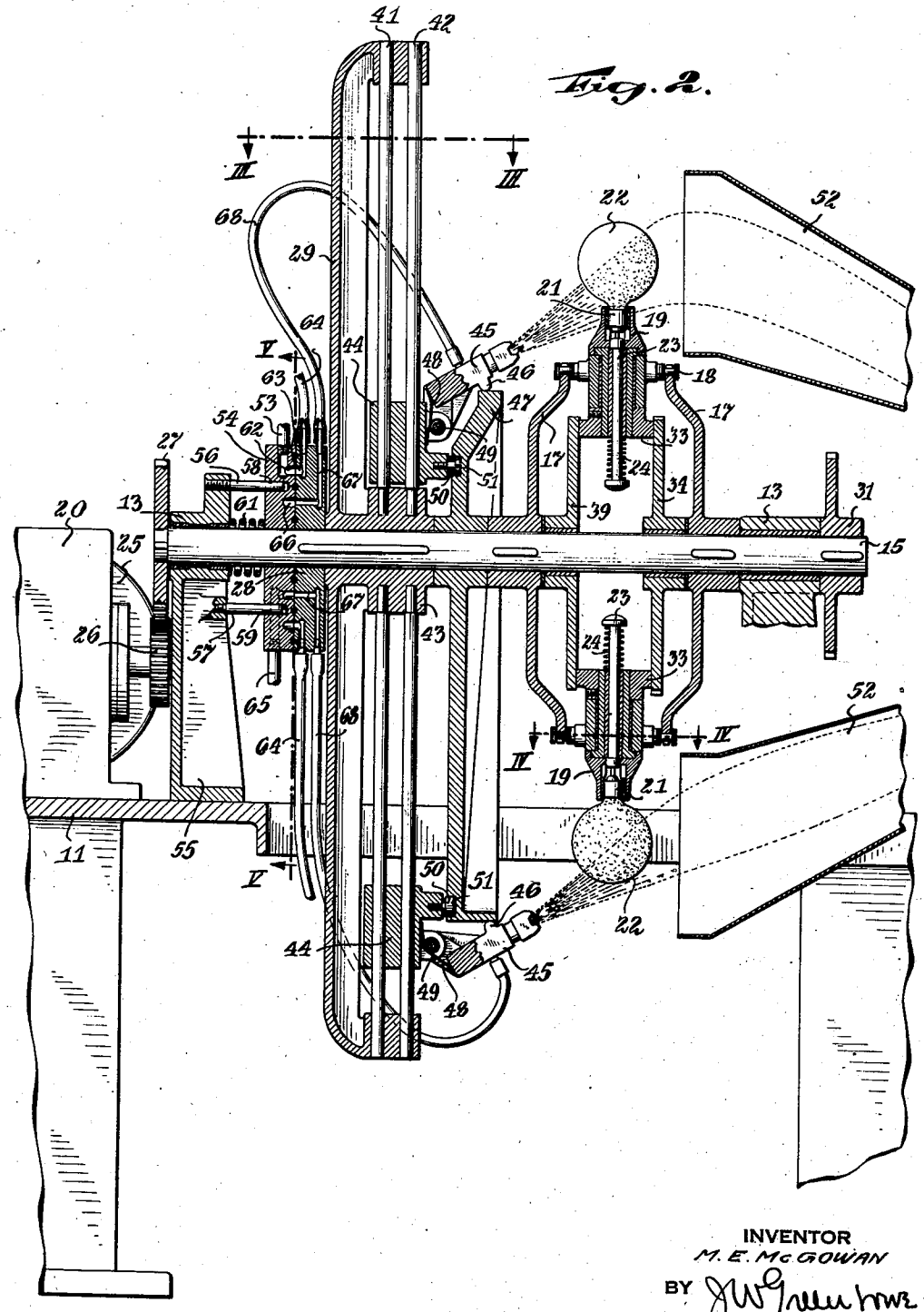
Fig. 1.

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Fig. 2.



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Fig. 3.

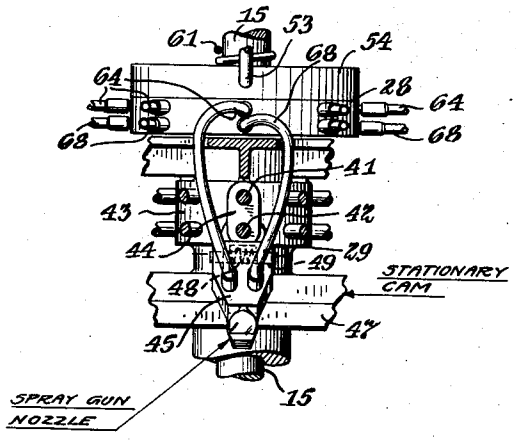


Fig. 4.

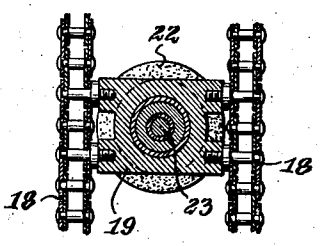


Fig. 5.

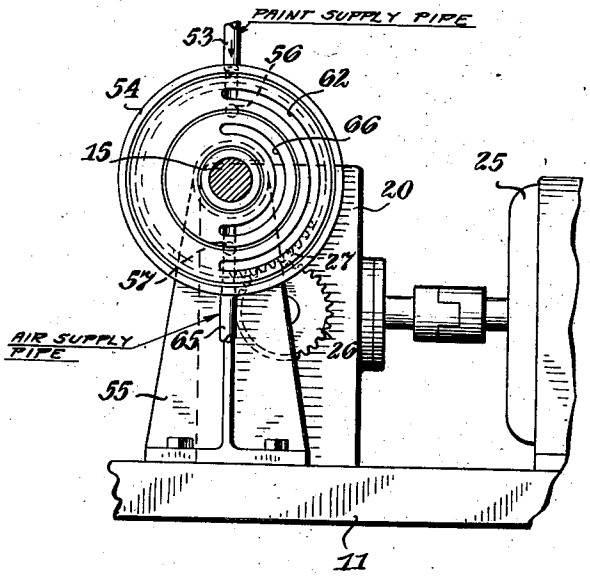


Fig. 6.

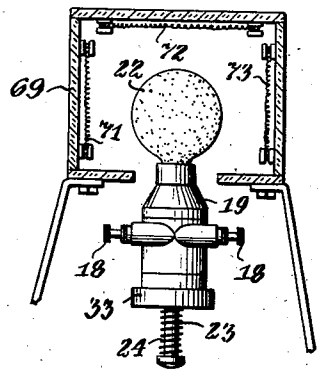
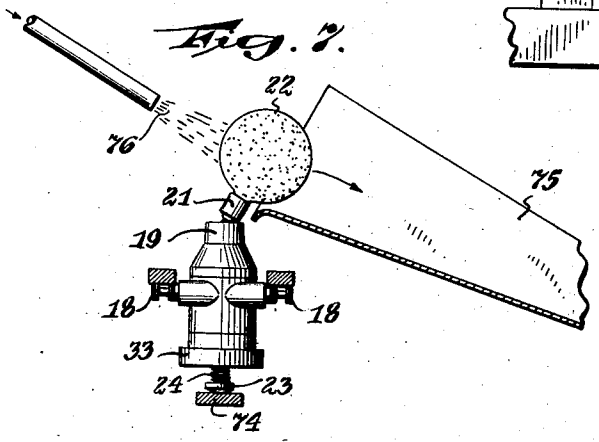


Fig. 7.



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Patented Sept. 19, 1944 2,358,651

UNITED STATES PATENT OFFICE

2,358,651

METHOD AND APPARATUS FOR SPRAYING LAMPS

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Application April 11, 1940, Serial No. 329,058

8 Claims. (Cl. 117—94)

This invention relates to a method and apparatus for coating vitreous or other articles, and more especially to such for spraying paint on the bulbs of incandescent electric lamps.

The principal object of my invention, generally considered, is to apply a coating of paint, or the like, to the outer surfaces of vitreous or other articles, such as lamp bulbs, for the purpose of making said bulbs translucent or colored for decorative or other purposes.

Another object of my invention is the application of paint or other coating material to lamp bulbs by automatic machinery instead of by hand.

A feature of the invention is the employment of a vertical sprocket and chain conveyor in continuous motion for transporting lamps while the bulbs thereof are being automatically sprayed.

Another feature of the invention is the employment of spray gun carriages reciprocating on radial slide rods and controlled by a grooved eccentric cam, in order to insure the uniform application of paint to the lamps.

A further feature of the invention is the pivotal movement of such spray guns about their carriages, in accordance with the shape of the peripheral surface of the controlling cam, in order to insure that the paint is properly directed on the lamps as the gun carriages reciprocate.

A still further feature of the invention is the use of spray guns which follow the continuous motion of a lamp conveyor, move radially and angle, all at the same time, thereby insuring the uniform application of paint to the lamps.

Another feature of the invention is the employment of a hood for carrying off the spray which does not adhere to the bulbs, in order to avoid polluting the air in the room.

An additional object of the invention is the employment of an oven for baking the coating on the lamps, while the same are traveling on the painting conveyor.

A further object of the invention is the provision of means for automatically ejecting the coated and baked lamps at the end of the baking period.

Other objects and features of the invention, relating to the specific arrangement and combination of the various parts, will become apparent as the description proceeds.

Referring to the drawings illustrating my invention;

Figure 1 is a side elevational view of apparatus for coating and baking lamps in accordance with my invention.

Figure 2 is an enlarged vertical sectional view, with parts in elevation, of the apparatus shown in Figure 1, in the direction of the arrows.

Figure 3 is a fragmentary sectional view on the line III—III of Figure 2, in the direction of the arrows.

Figure 4 is an enlarged fragmentary sectional view on the line IV—IV of Figure 2, in the direction of the arrows.

Figure 5 is a fragmentary sectional view on the line V—V of Figure 2, in the direction of the arrows.

Figures 6 and 7 are enlarged fragmentary sectional views on the correspondingly numbered lines of Figure 1, in the direction of the arrows.

Referring to the drawings in detail, like parts being designated by like reference characters, there is shown a support 11 carrying bearings 12 and 13, in which shafts 14 and 15 are respectively journaled.

The shaft 14 carries a pair of sprocket wheels 16 and the shaft 15 carries a pair of sprocket wheels 17, around which travels chain conveyor 18, bearing a plurality of sockets 19. Each socket is adapted to frictionally receive the base 21 of a lamp 22. The sockets 19 carry ejecter plungers 23, held in their retracted positions by means of springs 24.

The conveyor is operated continuously during the lamp-coating process, as by means of a motor 25, the armature shaft of which operates, through reduction gearing 20, a spur gear 26 meshing with a gear 27 keyed on drive shaft 15. On the shaft 15 are also keyed the revolving valve element 28, the slide rod holder 29, the sprocket wheels 17, and a spur gear 31.

Driving the sprocket wheels 17 by means of the motor 25, causes the chain conveyor to move around them and the sprocket wheels 16, in a direction indicated by the arrow 32 in Figure 1. While the lamps 22, carried in the socket 19, are thus moved, they are, at the same time, rotated about their axes, by having their base portions 33 frictionally engaged by the side of the gear wheel 34. Said gear wheel 34 is driven from the spur gear 31 on shaft 15, through idler 35, intermeshing gear 36, shaft 37, on which gear 36 is fixed, and gear 38 also fixed on said shaft. The latter gear meshes with the gear 34, and thereby rotates the lamps 22. For neutralizing the lateral pressure of the gear 34 on the base portions 33 of the sockets 19, an idler wheel 39 is desirably provided on the shaft 15, as shown most clearly in Figure 2, which wheel engages the opposite sides of the bases 33 and opposes the pressure of the gear 34 thereon.

The slide rod holder 29 carries a plurality of pairs of rods 41 and 42, extending radially from the hub 43, and on which reciprocate the slide carriages 44. On each slide carriage is pivoted a spray gun 45, carrying a cam abutment 46, which may be replaced by a roller, if desired, and resiliently urged into engagement with cam 47 by means of spring 48, so that upon rotation of the slide rod holder, the spray guns move about their pivots 49 in accordance with the shape of the cam 47, whereby they at all times direct paint spray on the lamps 22. Radial movement of the slide carriages 44 on the slides 41 and 42 is effected by rollers 50 thereon, riding in a cam groove 51 in the cam 47. The shape of the cam groove is such that it cooperates with the shape of the periphery of the cam 47 to properly direct and evenly distribute the paint sray on the rotating lamps, as indicated most clearly in Figure 2, whereby the same are uniformly coated as desired. Excess spray, or that blown beyond the lamps is carried off by the vacuum hood arrangement 52.

Paint and compressed air for the lamps are supplied to the guns 45 by pipe 53 to the non-rotating valve element 54, held to the bracket 55, which supports one of the bearings 13, by rods 56 and 57 fixed thereto, and slidably fitting pockets 58 and 59 in said valve element 54. The element 54 is resiliently urged into air-tight engagement with the revolving valve element 28 by compression coil spring 61, acting thereagainst from the bracket 55.

Paint or coating material goes from a source of supply (not shown) through said pipe 53, port 62 in the valve element 54 to registering ports 63 in the revolving valve element 28, and is from there transmitted through flexible conduits or rubber hose 64 to the paint inlets of the corresponding guns 45.

In the same way compressed air is fed to the valve element 54 from a compressor or source (not shown), through pipe 65, along the port 66 of said valve element 54, to registering ports 67 in the rotating valve element 28, and from there through flexible conduits or rubber hose 68 to the air inlet ports of the corresponding guns 45.

The ports 62 and 66, as shown most clearly in Figure 5, extend only approximately 180° around the perimeter of the valve element 54 so that the guns are only operated for spraying paint for one-half of each revolution, that is, while the lamps are going through the 180° from the top of the conveyor, around the outer semicircumference of the sprocket wheels 17, to the bottom of said conveyor, as shown most clearly in Figure 1, thereby avoiding waste of paint when the lamps are not in position for being sprayed.

The lamps may be fed to the conveyor at the place marked "Charge" in Figure 1, and are from there transported around the sprocket wheels 17 where they are sprayed or coated by means of the apparatus heretofore described. They then pass through an oven 69, provided with heating elements of any desired character, such as coils 71, 72 and 73, energized by suitable electric current, whereby the coating is baked on the lamps. As each lamp 22 emerges from the oven, the inner end of its ejecting plunger 23 is engaged by a discharge track cam 74, whereupon the lamp is pushed out of the socket 19, as shown most clearly in Figure 7, to be carried to a discharge chute 75, as by means of a blast of air 76.

From the foregoing disclosure, it will be seen that I have provided a method and apparatus for taking lamps after the same are fed to a conveyor thereof, moving them around a preferably vertical semicircle adjacent a paint spraying hood, while rotating them about their axes during which time they are reversed in position while being automatically coated with paint, or the like, from various angles by means of spray guns operated by compressed air, in order to apply the desired coating on the outer surfaces thereof in a uniform manner, while the same are rotating and revolving, from whence they are automatically passed through an oven where the coating is baked thereon during another reversal in position, and are finally automatically ejected.

Although a preferred embodiment of my invention has been disclosed, it will be understood that modifications may be made within the spirit and scope of the appended claims.

I claim:

1. Apparatus for coating an article, comprising conveyor means for moving the same through an arc, means for simultaneously causing said article to rotate about an axis radial to said arc at all times during said movement, and means for causing a spray device to revolve and simultaneously oscillate to follow and direct material on said article from varying angles as it moves around said arc, in order to effect uniform coating.

2. Apparatus for spraying the outer surfaces of vitreous articles, comprising conveyor means in which said articles are received and moved through a vertical arc, means for rotating said articles about axes corresponding with the radii of said arc at all times during said movement, paint spraying means, means for moving said spraying means with said conveyor means during movement through said vertical arc, and means for radially moving, in a plane parallel to the plane passing through said arc, and simultaneously oscillating said spraying means to direct paint on said articles from varying angles during the coating operation, in order to effect a uniform distribution of said paint thereon.

3. Apparatus for coating the outer surfaces of vitreous articles, comprising conveyor means in which said articles are received and moved through a vertical arc, means for rotating said articles about axes corresponding with the radii of said arc at all times during said movement, paint spraying means, means for moving said spraying means with said conveyor means during movement through said vertical arc, means for radially moving, in a plane parallel to the plane passing through said arc, and simultaneously oscillating said spraying means to direct paint on said articles from varying angles during the coating operation, in order to effect a uniform distribution of the paint on said articles, and baking means enclosing another portion of said conveyor means, including a vertical arc complementary to the spraying arc, through which said articles pass while being reversed in position.

4. Apparatus for coating the outer surfaces of vitreous articles, comprising conveyor means in which said articles are received and moved through a vertical arc, means for rotating said articles about axes corresponding with the radii of said arc at all times during said movement, paint spraying means, means for moving said spraying means with said conveyor means during movement through said vertical arc, means for radially moving in a plane parallel to the plane passing through said arc, and simultaneously os-

cillating said spraying means to direct paint on said articles from varying angles during the coating operation, in order to effect a uniform distribution of the paint on said articles, baking means enclosing another portion of said conveyor means, including a vertical arc complementary to the spraying arc, through which said articles pass while being reversed in position, and means for automatically ejecting said articles, one by one, as they emerge from said baking means.

5. Apparatus for coating an article, comprising conveyor means for simultaneously moving it from one level to another and turning it over, and means for causing a coating device to move, oscillate and keep pointed at said article during its movement, so as to direct a spray thereon from varying angles in order to effect uniform coating thereof.

6. Apparatus for coating an article comprising conveyor means for moving the same from one level to another while completely reversing it, means for simultaneously rotating it about its axis, and means for moving, oscillating and keeping a coating device pointed at said article, to direct a spray thereon from varying angles and effect uniform coverage.

7. Apparatus for coating incandescent electric lamps, comprising means for holding the bases of said lamps and moving the same from one level to another, while completely reversing them in position, means for simultaneously rotating said lamps about longitudinal axes through their bases, spraying means, and means for directing paint from said means on said lamps from different angles while so moving, in order to effect uniform distribution.

8. The method of coating vitreous articles, comprising revolving said articles through an arc, so that they are completely reversed in position, rotating them at all times during said revolution about axes corresponding with radii of said arc, spraying coating material on them while so moving, revolving the same through another arc to return them to original position, rotating them at all times during said revolution about axes corresponding with radii of said second arc, and baking said coating material thereon during said return movement through said second arc.

MICHAEL E. McGOWAN.